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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/806,806 | 03/23/2004 | Clement J. Fortin | END920020027US2 | 2910 |
| 7590 | 11/15/2005 | | EXAMINER | |
| John A. Jordan, Esq. 11 Hyspot Road Greenfield Center, NY 12833 | | | DOLAN, JENNIFER M | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2813 | |

DATE MAILED: 11/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/806,806

Applicant(s)

FORTIN ET AL.

Examiner

Jennifer M. Dolan

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,238,223 to Cobbley et al. (cited by applicant) in view of U.S. Patent No. 5,128,746 to Pennisi et al. (cited by applicant).

Cobbley discloses an electronic package (figures 1 and 6), comprising: a substrate (14) having at least two electrical contacts (18) thereon (figure 1); and a passive SMD (10; column 8, lines 50-55, 62-64) having at least one electrical contact at each end thereof (12), each having at least a lower electrical contact portion ('bottom' of 12 in figure 1) and an upper electrical contact surface ('outer side' of 12 in figure 1) at the terminus, with at least the lower electrical contact portion respectively positioned toward the electrical contacts of the substrate (figure 1), and with the lower and upper contact portions bonded by a solder connection to the electrical contacts on the substrate (through 16; column 9, lines 1-5), the passive SMD having a pre-form/noflow resin (15) in the space between the passive SMD and the substrate (figure 1). Cobbley further teaches that the capacitor is a "dog-bone" type capacitor (figure 1).

Cobbley fails to disclose that the resin fills the space between the SMD and the substrate, such that the resin forms fillets around the SMD solder connection. Cobbley further fails to disclose that the resin is formed from an epoxy-based flux encapsulant.

Pennisi teaches that an underfill resin should be applied in such a manner that the resin completely fills the area between the SMD and substrate (column 2, lines 30-50), and further forms fillets (260) around the SMD solder connection (figure 2; column 3, lines 45-50). Pennisi further teaches that the adhesive resin is an epoxy-based flux encapsulant (column 3, lines 5-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the structure of Cobbley, such that the underfill resin is formed from an epoxy-based flux encapsulant that completely fills the space between the SMD and substrate, forming fillets around the solder connections, as suggested by Pennisi. The rationale is as follows: A person having ordinary skill in the art would have been motivated to form the resin of Cobbley such that it completely fills the space between the SMD and substrate, forming fillets around the solder connections, because Cobbley notes that the resin is used as a flip chip adhesive underfill (Cobbley, column 8, lines 55-58), and Pennisi shows that a flip chip underfill needs to completely fill the space between the chip and substrate in order to provide maximum environmental protection for the device (Pennisi, column 2, lines 30-50). Furthermore, Pennisi shows that providing an excess of underfill, such that fillets are formed leads to the formation of a continuous seal around the periphery of the device to fully protect and encapsulate the device (Pennisi, column 3, lines 45-50; line 65 – column 4, line 5). A person skilled in the art would further use an epoxy flux encapsulant material as the underfill, because Pennisi shows that such an underfill material provides fluxing action for the solder interconnection, while protecting the

Art Unit: 2813

device from contamination or the need for extra cleaning steps (see Pennisi, column 3, lines 5-15; 40-67; column 2, lines 1-30). Since Pennisi further suggests that any surface mount component using solder connections may be used as the chip component of Pennisi (see Pennisi, column 3, lines 50-56), it is apparent that the underfill structure of Pennisi could be applied to the surface mount capacitor of Cobbley.

Response to Arguments

3. Applicant's arguments filed 8/19/05 have been fully considered but they are not persuasive.

The Applicants argue that Pennisi is drawn to using noflow encapsulants for attaching a die to a substrate, whereas the Applicants' invention is directed to using noflow encapsulants for attaching a passive SMD to a substrate. The Applicants further argue that Pennisi is only directed toward attaching solder bumped chips to a substrate, and thus is not applicable to attachment of a passive SMD.

This is not persuasive, because both Pennisi and Cobbley equate the usage of integrated circuit dice and any other surface mount component in their teachings (see Pennisi, column 3, lines 51-56 and Cobbley, column 3, lines 1-10; column 5, lines 5-18; column 8, lines 50-67). The term "surface mount device" is even recognized in the art of semiconductor devices as referring to any chip, die, or device that is soldered directly to the surface of a circuit board rather than being connected to the board using through-holes (see the Blackwell 'Surface Mount Technology' chapter, provided herewith). Since both Cobbley and Pennisi are then drawn to mounting SMDs on a substrate using a noflow underfill and solder reflowing of solder bump

Art Unit: 2813

contacts (note that contacts 12 in Cobbley are solder terminations that are joined to the substrate through solder reflow processing – column 8, line 62 – column 9, line 5), the Examiner considers it apparent that the teachings of Cobbley and Pennisi are in analogous arts and may be reasonably combined, regardless of whether Pennisi is specifically drawn to active, as opposed to passive, SMDs. As Cobbley teaches the general conditions of the claims, except that the noflow underfill is not provided as a complete, or void-free underfill (see Cobbley, figure 1), and since Pennisi teaches that it is generally desirable when attaching a SMD to provide sufficient underfill material such that the contact surface of the SMD is completely encapsulated by the underfill (as explained in the rejection supra), the Examiner maintains that a person having ordinary skill in the art would find ample motivation as well as expectation of success in combining the SMD ‘complete underfill’ teachings of Pennisi with the SMD mounting structure of Cobbley.

Regarding the Applicants’ implication that the disclosed invention solves a known problem in the prior art and apparently provides some sort of unexpected result (see Applicants’ arguments, page 10), the Examiner must respectfully disagree with these implications. Pennisi specifically teaches that it is necessary to provide a complete underfilling between the SMD and substrate (see column 2, lines 30-35), and that by providing sufficient underfill to completely encapsulate the contact surface of the SMD, the SMD is provided with improved environmental protection (see column 3, lines 45-50). Hence, Pennisi already teaches the advantages of preventing contaminants from entering the gap between the SMD and substrate, as well as controlling the character of the solder material during reflow. It would be well apparent to a person skilled in the art that since both active and passive SMDs use similar solder connections with reflow steps, are formed of similar materials, and are lumped together as alternately usable

Art Unit: 2813

components by the prior art (again, see Pennisi, column 3, lines 51-56 and Cobbley, column 3, lines 1-10; column 5, lines 5-18; column 8, lines 50-67), similar mounting technologies would be used for both active and passive SMDs, and that the mere replacement of an active SMD with a passive SMD is not sufficient to support unobviousness.

The Applicant further argues that Pennisi does not teach the formation of fillets around the solder connections of a passive SMD. This is not persuasive, since Pennisi specifically teaches the formation of a meniscus (260) surrounding the solder connections of the active SMD, and hence, forming a fillet around such connections. Since the environmental protection resulting from the complete encapsulation of the meniscus would provide the same benefits to either a passive or active SMD, the Examiner maintains that it would be apparent to a person skilled in the art to apply such a fillet or meniscus to the passive SMD of Cobbley. The fact that the Applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

Art Unit: 2813

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (571) 272-1690. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer M. Dolan
Examiner
Art Unit 2813

jmd


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
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